

REMARKS

1. Claims 16-23 and 46-51 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,504,053 to Chou et al (hereinafter “Chou et al.”).

In determining whether a prior art reference renders a claim obvious, it is “important to identify a reason that would have prompted a person of ordinary skill in the art to combine the elements as the new invention does.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1731 (2007). “[S]imply because an invention falls within a range disclosed by prior art does not necessarily make it per se obvious. Both the genus and species may be patentable.” *Iron Grip Barbell co. v. USA Sports Inc.*, 392 F.3d 1317, 1321 (Fed. Cir. 2004). The *prima facie* presumption of obviousness is rebutted if an Applicant can show “(1) [t]hat the prior art taught away from the claimed invention . . . or that there are new and unexpected results relative to the prior art. . . .” *Id.* at 1322. For example, in *Ex parte Yoshimi Yamadera and Eiki Nagashima*, the Board of Patent Appeals and Interferences found that the general teachings of a prior art reference would not have motivated the skilled person to the limits of the broad ranges disclosed in light of the teachings of the prior art reference and the examples which directed the skilled person away from the claimed invention. 2007 WL 2219586 (Bd. Pat. App. & Interf. Aug. 1, 2007).

Applicants claimed process for preparing a catalyst composition in the present application relates to selecting a support having a surface area of at least 500 m²/kg and less than 5000 m²/kg, and depositing on the support:

silver metal,

a metal or component comprising rhenium, tungsten, molybdenum or a nitrate- or nitrite-forming compound, and

a Group IA metal or component comprising a Group IA metal having an atomic number of at least 37, and in addition potassium, wherein

the value of the expression of $(Q_K/R) + Q_{HIA}$ is in the range of from 1.5 to 30 mmole/kg, wherein Q_{HIA} and Q_K represent the quantities in mmole/kg of the Group IA metal having an atomic number of at least 37 and potassium, respectively, present in the catalyst composition,

the ratio of Q_{HIA} to Q_K is in the range of from 1:1 to 5:1,

the value of Q_K is at least 0.01 mmole/kg, and

R is a dimensionless number in the range of from 1.5 to 5.

In accordance with the invention, the initial activity of the catalysts, the performance in the course of the catalysts' lifetime and the lifetime itself are improved when, in the preparation of high selectivity catalysts which use supports having a surface area of at least 500 m²/kg and less than 5000 m²/kg, a portion of the higher Group IA metal is substituted for potassium. For example, as discussed in the working examples of the application text, as filed, Example 2 contained 3.4 mmole Cs/kg while Examples 3, 4, and 5, according to the invention, replaced some of the higher Group IA metal (e.g., cesium) with potassium such that the value of $(Q_K/R) + Q_{HIA}$ was kept approximately constant. Catalysts prepared in accordance with the invention in Examples 3, 4, and 5 demonstrated an unexpected improvement in catalytic performance over Example 2. In particular, Examples 3, 4, and 5, according to the invention, demonstrated an improved initial activity (e.g., 253 °C, 252 °C, and 251 °C, respectively) compared to Example 2 (e.g., 257 °C). Examples 3, 4 and 5, according to the invention, also demonstrated improved long-term selectivity stability (e.g., 86.8%, 87.2%, and 87.2%, respectively, at a cumulative EO production of 640 T/m³) compared to Example 2 (e.g., 85.8% at a cumulative EO production of 640 T/m³).

As discussed in the remarks/arguments made in the prior Amendment, dated July 6, 2007, which remarks/arguments are hereby incorporated by reference, Chou et al. relates to a silver epoxidation catalyst which contains a manganese component. Chou et al. generally disclose redox pair catalysts and catalysts other than redox pair catalysts.

The possible cation promoters for catalysts other than redox pair catalysts generally taught by Chou et al. include alkali metal and/or alkaline earth metals such as lithium, sodium, potassium, rubidium, cesium, beryllium, magnesium, calcium, strontium and barium, as well as Group 3b metal ions including scandium, yttrium, lanthanum and the lanthanide series metals. The Examiner asserts that Chou et al. discloses a cesium concentration in the range of 0.0005 to 1.0 weight percent; however, Chou et al. is disclosing the concentration of the salt(s) in the finished catalyst, based on the cation (e.g., cesium), and not the concentration of cesium. The salt(s) may include the cation promoters as well as the anion promoters. Thus, the cation of the salt(s) may include cesium as well as any other cations (associated with the anion promoters) or additional cation promoters present in the catalyst. Chou et al. does disclose that the total amount of cation promoters may vary widely, for example between about 10 and about 4000 ppmw, based on the total carrier material, and that the ratio of cesium salt (when used in the mixture with other cations) to other salt(s) may vary from about 0.0001:1 to 10,000:1, preferably 0.001:1 to 1000:1; preferably cesium comprises at least

about 10, more preferably, about 20 to 100 percent by weight of total added alkali metal and alkaline earth metal in the finished catalyst. This generic disclosure relied upon by the Examiner describes very broad ranges for the possible amounts of cesium relative to the weight of the total added alkali metal and alkaline earth metal, not specifically potassium and not in the amounts as claimed in claim 16.

Further, when using other than a redox pair catalyst, Chou et al. disclose that the catalyst preferably has an amount of acid leachable potassium of less than about 50, preferably less than about 25, e.g., 0 to 25 ppmw, based on the weight of the catalyst. *U.S. Patent No. 5,504,053*, col. 9, ll. 45-49; col. 16, ll. 16-24. It can be seen from the description of carriers in the working examples of Chou et al. that acid leachable potassium can be found in the carrier material without any purposeful addition of potassium. Therefore, Chou et al. teaches away from the addition of potassium as a cation promoter for catalysts other than a redox pair catalyst.

Further, in the working examples of Chou et al., for catalysts other than redox pair catalysts, it appears from the disclosure that only cesium was deposited as a cation.

These disclosures of Chou et al. are generic and would not have prompted the skilled person to combine the specific elements as claimed in claim 16, in particular preparing a high selectivity catalyst using a support having a surface area of at least 500 m²/kg and less than 5000 m²/kg and depositing on the support a Group IA metal having an atomic number of at least 37 and in addition potassium, wherein $(Q_K/R) + Q_{HIA}$ is from 1.5 to 30 mmole/kg, the ratio of Q_{HIA} to Q_K is from 1:1 to 5:1, and Q_K is at least 0.01 mmole/kg.

Further, for the redox pair catalysts, an embodiment is disclosed wherein the catalyst contains at least one efficiency-enhancing salt of a member of a redox-half reaction pair. In this embodiment, potassium is the preferred cation although sodium, rubidium and cesium may also be operable and the preferred anions are nitrate, nitrite and other anions capable of forming nitrate ions under epoxidation conditions. The most preferred salt of a member of a redox-half reaction pair being potassium nitrate. The amount of efficiency-enhancing salt may vary over a wide range, in particular from about 0.01 to about 5 percent, calculated as the cation relative to the weight of the catalyst. In another embodiment, the redox pair catalyst comprises alkali metal nitrate, especially potassium and/or rubidium nitrate, especially in amounts greater than about 400 or 500 ppmw, based on the weight of potassium. In the working examples of Chou et al., for redox pair catalysts, it appears from the disclosure that either potassium or rubidium, and not the combination, was used as the alkali metal cation.

Neither the generic disclosures of Chou et al. relating to the redox pair catalysts or the working examples would have prompted the skilled person to combine the specific elements as claimed in claim 16, in particular preparing a high selectivity catalyst using a support having a surface area of at least 500 m²/kg and less than 5000 m²/kg and depositing on the support a Group IA metal having an atomic number of at least 37 and in addition potassium, wherein $(Q_K/R) + Q_{HIA}$ is from 1.5 to 30 mmole/kg, the ratio of Q_{HIA} to Q_K is from 1:1 to 5:1, and Q_K is at least 0.01 mmole/kg.

As discussed hereinbefore, catalysts prepared according to the invention unexpectedly exhibit improved performance compared to catalysts which are not prepared according to the invention.

In light of the discussion above, Applicants respectfully request the rejection be withdrawn.

Applicants respectfully request a timely Notice of Allowance be issued in this case. If the Examiner would like to discuss this case with Applicants attorney, the Examiner is invited to contact the undersigned at the phone number below. Should any fee be due in connection with the filing of this response, the Commissioner for Patents is hereby authorized to deduct said fee from Shell Oil Company, Deposit Account No. 19-1800.

Respectfully submitted,

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